SEAPRAP RESEARCH
REPORT NO. 45

FERTILITY AND FAMILY PLANNING
A CASE STUDY OF NGAO DISTRICT
LAMPANG, THAILAND

MINGSARN SANTIKARN
Faculty of Social Sciences
Chiangmai University
Chiang Mai, Thailand

January 1980

A report of research undertaken with the assistance of an award from the Southeast Asia Population Research Awards Program (SEAPRAP), Institute of Southeast Asian Studies, Republic of Singapore

(an edited version)

TABLE OF CONTENTS

FERTILITY AND FAMILY PLANNING : A CASE STUDY OF NGAO DISTRICT[1]

I. INTRODUCTION

One of many common experiences of less developed countries is that improved public health measures implemented after the second World War have substantially reduced mortality, resulting in a large increase in population. Between 1947-1969, Thailand registered an annual compound rate of population growth of 3.1 per cent (Population Council, 1969). In 1960, total population was 27.2 million. At present, total population has been estimated at approximately 45 million. One study projected population for Thailand for 1990 as 70.5 million (Chalatorn, 1910).[2] Population and manpower planning has become an inevitable strategy for development. The Thai government finally declared a national population policy in 1970 aiming at reducing the population growth of over 3 per cent to 2.5 per cent by the end of 1976, and to 2.1 by 1981.

Recent studies have suggested a decline in fertility in Thailand between mid 1960s and 1970s. The total fertility rate (TFR) fell from 6.4 in 1960 to 5.6 in 1970 (Prasithrathsin, 1976). The 1975 Survey of Fertility in Thailand estimated the TFR for the period 1965-69 as 6.2 and for the period 1970-74 as 4.8. In particular fertility has declined more sharply in the North and the central region of Thailand.

---

1. The author wishes to thank Prof R W Hodge and Dr Fred Arnold for their comments and advice on quantitative techniques, but the author is solely responsible for any mistakes or errors in interpretation.

2. The assumptions used in this projection were:

   (a) fertility : slight fertility decline beginning in 1970 such that the birth rate would fall by one-third to 1990.

   (b) mortality : moderate mortality decline corresponding to a yearly increase of one half year in the expectation of life at birth.

Pardthaisong (1978) found that there has been a marked decline in fertility trends in the Northern region, especially in Chiangmai and Lampun provinces. Similar statistics for Lampang, an adjacent province to Chiangmai and Lampun, also indicated declining trends although they occurred at a later date. On the other hand, Chiangrai, another adjacent province to Chiangmai showed relatively little evidence of a fertility decline. Parthaisong attributed the result of Chiangmai and Lampun to the relative efficiency of their family planning agencies, and the results of Lampang and especially Chiangrai to the differences in the access to the faimly planning program. A preliminary village survey of the Social Science Research Centre, Chiangmai University, suggests a drastic fertility decline in Chiangmai and a fairly significant decline in Chiangrai (SSRC, 1978).

Although there are a number of studies on fertility in Thailand (Knodel and Prachuabmoh, 1974; Rungpitarungsi, 1974; Chamratrithirong, 1976, Pardthaisong, 1978; SSRC, CMU, 1978), a case study of economic determinants of fertility in rural Thailand has been given relatively less attention. The study of fertility determination among rural and urban Thai women by Kirananda (1977) lacked data on income and economic status.

This study will explore the relationship between fertility and socioeconomic and demographic variables as well as the determinants of the acceptance of family planning in rural Thailand. In particular the study will concentrate on economic variables such as land tenure, size of land holding, cropping intensity, economic status as reflected by income and standard of living and so on. Investigations will also be made on the choice of contraception and the means through which villagers come into contact with a family planning program. This report is organised as follows. First, the study area, Ngao District, will be introduced. Next, sampling method is outlined followed by the data and the model and the research results on fertility determination. In the last section, family planning practices are briefly investigated.

II. A PROFILE OF NGAO DISTRICT

Ngao is one among 11 districts of Lampang Province which is 602 kilometers to the North of Bangkok, the capital city of Thailand. The district is 85 kilometers to the northeast of Lampang and is accessible by asphalt highways from Lampang, Prae and Payao Province. Most of the villages surrounding the district have no electricity and water supply and exhibit semi-subsistence type of economy. The majority of the population is engaged in multiple cropping of rice, garlic, red onions and chillies. The district was chosen for the study for two reasons. First, it has had a family planning program since 1972. Each sub-district (Tambol) has a health centre which provides (at least weekly) family planning service. In the last seven years, there have been encouraging signs of increasing acceptance of family planning. Secondly, most of the villages in the district can be reached by means of laterite roads.

The district includes the fan-shaped Ngao River valley and hills which are covered with moist teak forests. It consists of an area of 1,058,750 rai, but only 7.6 per cent (81,190 rai) is agricultural land.* Tables 1 and 2 show the agricultural land classified by land use and cash crops. Undoubtedly, the majority of the people in Ngao are engaged in agricultural activities and forestry.

A substantial amount of off-farm employment opportunities is provided by one forest nursery, three forest research stations, five forest management units and four teak plantation establishments of the Royal Forest Department, one elephant training school and several logging units of the Forest Industrial Organization.

Processing activities are few. There are 102 small rice mills and six tobacco curing stations. They provide mainly seasonal employment.

There are ten sub-districts (Tambol) and 51 villages (Moo Baan) in Ngao (Table 3). As of February 1979, the population in the Ngao district was approximately 44,800 constituting of 6,765 households.

---

*2.5 rai = 1 acre

Table 1. Land Use in Ngao (1978)

	Percentage
Paddy	44.0
Farmland	41.0
Fruit orchards	8.0
Vegetable farms	7.0
Total	100.0

Source : Agricultural Section, District Office

Table 2. Major Cash Crops in Ngao (1978)

	Area	
	(Rai)	(Percentage)
Rice - low land varieties	29,385	50.1
- high land varieties	6,670	11.3
Maize	13,000	22.2
Mung bean	4,370	7.5
Fruit	650	1.1
Tapioca	500	0.9
Soy bean	1,500	2.6
Peanut	2,497	4.3
Total	58,572	100.0

Source : As for Table 1

Table 3. Population in the Sub-districts of Ngao (February, 1979)

Name of Sub-districts (Tambol)	Number of Villages	Number of Residents			Number of Households
		Total	Male	Female	
1. Luang Tai	6	5,529	2,864	2,665	826
2. Baan Rong	6	2,931	1,503	1,428	828
3. Pong Tao	6	3,793	1,922	1,871	570
4. Na Kae	5	5,686	2,881	2,850	287
5. Baan Hachg	4	5,919	3,061	2,858	867
6. Baan Pong	6	3,927	1,964	1,963	909
7. Baan Huad	4	2,915	1,503	1,412	464
8. Baan Orn	5	3,481	1,677	1,804	514
9. Mae Teep	4	5,917	3,031	2,886	492
10. Luang Nua	5	4,621	2,420	2,201	938
Total	51	44,819	22,826	21,999	6,765

Source : As for Table 1

III. SAMPLING

A village was selected at random from each sub-district (Table 4). Sampling fractions were derived by dividing the number of households in each sub-district by the total number of households in the district. The number for the sample size was initially set in the research proposal at 100 households, but it was thought that the size of the sample could be increased slightly without increasing survey costs. Therefore, the sample size was increased to 132 to make it approximately 2 per cent of the total number of households in the district. Next, multiplying the sample size by the sampling fraction of each sub-district provided the number of households to be surveyed in each village.

Interviewers were instructed to walk in a clockwise manner once they entered the village. For instance, if the village consisted of 100 households and the number of households to be surveyed was 10, the interviewers would stop at the first house, the eleventh house, and so on. When this method was not possible for some geographical reason, interviewers were instructed to select sample households as equally spaced as possible. Respondents were limited to females aged between 15-45 and their husbands. For an extended family, the younger married couple was to be interviewed.

Three two-person teams, including the principle investigator, were involved in the fieldwork. The field survey took nearly three months, from April to early June. The delay was partly caused by early rain, and also because a large number of the household heads have off-farm employment and are usually absent during the day. So, many interviews were conducted either very early in the morning or at night. All 132 questionnaires were completed.

The questionnaire was translated (see Appendix 1). It is divided into seven parts, namely: data from observation, basic household data on occupation and income, residence, assets, family planning practices and attitudes towards family planning. The questionnaire was revised slightly after it was pretested with the 25 respondents who were excluded from the final analysis.

Table 4. Sampling fractions

	Selected Village	Sampling Fraction	Number of Households
1. Luang Tai	5th	.122	17
2. Baan Rong	1st	.121	16
3. Pong Tao	4th	.083	11
4. Na Kae	2nd	.042	6
5. Baan Haeng	1st	.127	17
6. Baan Pong	4th	.133	18
7. Baan Huad	1st	.068	9
8. Baan Orn	2nd	.075	10
9. Mae Teep	2nd	.072	10
10. Luang Nua	3rd	.138	18
Total			132

IV. DETERMINANTS OF FERTILITY

It is hypothesised that apart from demographic factors such as age and age at first marriage, fertility is affected by socioeconomic status, such as income and wealth, husband's occupation, mother's education, land size and child mortality. Theoretically as income rises or socioeconomic status improves, the demand for children increases, given that children are not considered as an inferior good. This is called the income effect. On the other hand, as socioeconomic status rises, the price of children also increases because higher income families may want better quality children (Leibenstein, 1974). This is the well-known price or substitution effect. If the price effect overwhelms income effect, the demand for children will decrease as income rises. However there could be a threshold income before which improvements in socioeconomic status

induce higher fertility but beyond which the income effect is overcome by the price effect. The latter case implies a non-linear relationship between fertility and income.*

Land size is used as a proxy for a need for unpaid labour. Arnold and Pejaranonda (1977) found that children were highly valued for their help on the family farm, especially for farms larger than ten rai. Therefore a positive relationship between land size and fertility could be expected.

Parents may desire a certain number of children that survive until adulthood. In a society where infant mortality is high, parents may desire a large family or may try to replace child losses. A reverse relationship between family infant mortality and fertility is hypothesised.

Mother's age is expected to be positively related to actual fertility because older women are likely to have completed their productive cycle. This phenomenon was confirmed in a study by Kirananda (1977). Parents' age may also affect desired fertility as older couples may adhere to a more traditional value that a large family means happiness. They may be approaching an age when the need for children as a source of security in old age becomes more apparent.

Monther's education is often found to be adversely related to fertility as it increases the opportunity cost of child bearing. However, preliminary screening revealed that the variation of the variable for mother's education within this sample is almost absent. The majority of mothers in the sample (120 out of 132 cases) have a four-year compulsory education. Seven women have no education or less than a four-year education. The rest (five cases) have been to a teachers' training college. It was therefore decided that this factor should be dropped from further analysis. Other variables will be looked at in some detail.

---

*For a summary of empirical results on fertility and income, see James M. Creager et al. 1974.

4.1 Dependent variables

The number of live births and the number of pregnancies were used as measures of actual fertility. Preliminary results showed that there was very little difference (in terms of R^2) between their relationship to the same set of independent variables, i.e., their R^2's are nearly of the same size. Therefore only the number of pregnancies (P) was used as the dependent variable for actual fertility. The ideal family sizes of husbands and wives are the other two dependent variables for desired fertility.

4.2 Independent variables

4.2.1 Income, Wealth and Standard of Living. A number of measures are used as alternative proxies for economic status viz. per capita household income (Y), material possession index (MPI) and material well being indices (MWB).

Household income includes both cash income, non cash income, animals and agricultural produce consumed by the family. It was observed that family members of a great number of respondents are engaged in hunting wild animals and collecting natural products from forests, e.g. insects, herbs, bamboo, bamboo shoots, etc. Some of them are engaged in the illegal cutting of teak and the income from this was not disclosed. Moreover, current income may vary from the permanent income on which the fertility decision is based. Therefore, other measures of accumulated wealth or assets, in this case MPI and MWB, are used to supplement the income variable.

MPI is obtained in the following manner.* Assets are ordered according to their frequencies, i.e. the number of households where an asset was found (Table 5). These frequencies are converted into percentage points. For instance, those found in all households are given 100 percentage points and are given the lowest score, that is one. Items whose frequencies are within 10 per cent of the first item are given the same score and those outside the 10 per cent boundary are given an additional score, and so on.

---

* See details in Prasithrathsin (1979).

Table 5. MPI Scoring

	Assets	Frequencies	Percentage	Scores
1.	Mattresses	132	100.0	1
2.	Mosquito nets	132	100.0	1
3.	Earthen stoves	130	98.4	1
4.	Can lamps	122	92.4	1
5.	Torches	120	90.9	1
6.	Transistor radios	118	89.3	2
7.	Water tanks	112	84.8	2
8.	Small silos	109	82.5	2
9.	Wardrobes	98	74.2	3
10.	Cupboards	97	73.4	3
11.	Thermos (for ice)	96	72.7	3
12.	Ploughs	89	67.4	3
13.	Bicycles	87	65.9	3
14.	Tables	67	50.7	4
15.	Flat Irons	67	50.7	4
16.	Thermos (for hot water)	65	49.2	4
17.	Carts	49	37.1	5
18.	Beds	44	33.3	5
19.	Motorcycles	39	29.5	5
20.	Armchairs	36	27.2	6
21.	Electric bulbs	36	27.2	6
22.	Insecticide spraying equipment	35	26.5	6
23.	Kerosine lamps	32	24.2	6
24.	Water wells	28	21.8	6

Table 5 (continued)

Assets	Frequencies	Percentage	Scores
25. Sewing machines	19	14.3	7
26. Utility cars	10	7.5	7
27. Water pumps (for paddy)	8	6.0	7
28. Small tractors	6	4.5	7
29. Water pumps (for home use)	5	3.7	8
30. Electrical irons	5	3.7	8
31. Televisions	4	3.0	8
32. Thrashing machines	4	3.0	8
33. Artesian wells	3	2.2	8
34. Electrical generators	3	2.2	8
35. Refrigerators	3	2.2	8
36. Gas stoves	2	1.5	8
37. Electric stoves	1	0.7	8
38. Electric rice cookers	1	0.7	8
39. Batteries	1	0.7	8
40. Electric fans	1	0.7	8
41. Electric sewing machines	1	0.7	8

From Table 5, mattresses and mosquito nets were found in every household and thus were given a score of one. Electrical appliances were found in very few households and were given the highest score, which is eight.

These scores were added up for each household. However, it should be noted that although MPI is a convenient means to provide a picture of the economic ranking of sampled households, it has no strong statistical back-up and therefore the third measure, the material well-being index, is also tried.

Material-well-being indices were derived by means of a factor analysis. Assets possessed by every household were dropped because they do not differentiate one household from another in terms of their wealth. Those assets possessed by very few or the very rich (by rural standards) were also dropped from the analysis. These assets are mostly electrical appliances, motor-cars and so on. Material well-being indices consist of five variables as shown in Table 6.

To obtain composite indices (MWB_i) for each household, multiply the number of each asset by its factor score.* Then sum these within a group for each individual.

4.2.2 Land size . Land size may be highly related to higher income, which may cause multicollinearity. However, in the case of Ngao district, the correlations between land size and income measures are less than .25. Larger plots of land in the district may be unfertile, or marginal land because a large part of the district is hilly.

4.2.3 Occupations of husbands. Husband's occupations are represented by three dummy variables for farmers, government employees or public servants and other occupations. These variables also reflect partly the influence of education for the head of households. Farmers generally have lower education than those in other professions. Thus it is expected that the size of coefficients for farming occupations will be larger than the rest.

4.2.4 Age at first marriage. Age at first marriage is entered into the model as a biofactor or a supply condition. Obviously, a woman is more productive if she is married early in life. Thus a negative relationship between actual fertility and age at first marriage can be expected.

---

* Since a factor score is given as a standard score, it must be converted into a raw score form by dividing the factor score of each variable by its standard deviation.

Table 6. Material Well-being Indices

Assets	Factor Loading	Factor Scores
MWB 1 : General Household Assets		
(a) Tables	.742	.202
(b) Beds	.794	.216
(c) Wardrobes	.836	.228
(d) Arm chairs	.647	.176
(e) Transistor radios	.640	.175
(f) Thermos (for hot water)	.652	.178
(g) Thermos (for ice)	.723	.197
MWB 2 : Utilities		
(a) Stoves	.551	.424
(b) Water tanks	.726	.560
(c) Electrical bulbs	.682	.525
MWB 3 : Transport Equipment		
(a) Carts	.759	.623
(b) Bicycles	.656	.538
(c) Motorcycles	.458	.376
MWB 4 : Agricultural tools		
(a) Small silos	.809	.503
(b) Ploughs	.786	.489
(c) Insecticide spraying equipment	.576	.358
MWB 5 : Housing qualities		
(a) Roofing	.777	.642
(b) Dimensions of the house	.777	.642

4.2.5 Infant mortality. The number of infant deaths in a family is used as a proxy for this variable. In this sample of 132 mothers, child deaths are not uncommon and 77 infant deaths were recorded. Thus this variable is expected to have a positive relationship with both actual and desired fertility.

4.2.6 Parents' age. Only the mother's age was included as an independent variable in the analysis of actual fertility. Both fathers' and mothers' ages were included in the analysis of their respective desired fertility.

4.2.7 Sex preference. Sex preference is one variable which may be an important influence on ideal family size in some cultures. For this study, sex preference was asked in questionnaire No. 7.3, from which the proportion of boys and the excess number of boys over girls were obtained and used as proxies for sex preference.

4.3 The Findings : Actual Fertility

Multiple linear regressions were first used to analyse the data. Since the relationship between economic status and fertility may not be linear, two regressions were tried. The first regression has per capita household income (Y) as an independent variable. The second has both Y and Y^2 as predictors. The results are as follows:

$$P = 5.08 - \underset{(4.06)}{\underset{(.00)}{.0005Y}} + \underset{(3.41)}{\underset{(.00)}{.00000001}}$$

$$P = 4.11 - \underset{(2.18)}{\underset{(.00)}{.0001Y}} \; ; \quad F = 4.768, \; \bar{R}^2 = .027$$

$$F = 8.297. \; \bar{R}^2 = .10$$

By having Y^2 in the equation and despite the small coefficients, F value and $\bar{R}^2$ increase substantially. These results seem to suggest that the relationship between the two variables may not be linear, and dummy variables for income were used instead. In addition all proxies for economic status, age of respondents, and land sizes were entered as dummy variables as follows.

List of Dummy Variables

Variable Names	Symbols	Description[a]
1. Per capita household income (p.a.)	YN1	LE ฿ 1500
	YN2	GT ฿ 1500 AND LE ฿ 2500
	YN3	GT ฿ 2500 AND LE ฿ 4500
	YN4	GT ฿ 4500
2. Material Possession Index	MP11	LE 36 points
	MP12	GT 36 AND LE 47
	MP13	GT 47 AND LE 62
	MP14[b]	GT 62
3. Land size	L1	LE 3 rai
	L2	GT 3 AND LE 6 rai
	L3	GT 6 AND LE 9 rai
	L4	GT 9 rai
4. Mother's age	A1	GT 51 AND LE 20
	A2	GT 20 AND LE 25
	A3	GT 25 AND LE 30
	A4	GT 30 AND LE 35
	A5	GT 35 AND LE 40
	A6[b]	GT 40 AND LE 45
5. Father's age	AH1	LE 25
	AH2	GT 25 AND LE 30
	AH3	GT 30 AND LE 35
	AH4	GT 35 AND LE 40
	AH5	GT 40 AND LE 45
	AH 6	GT 45
6. Father's occupation	OF	Farmers
	OG	Government employees
	OTH[b]	Others

Notes : (a) LE = Less than or equal to
GT = Greater than

(b) The omitted category in multiple regression analysis

The regression with three alternative measures is presented in Table 7. The three equations are very similar. MPI and MWB do not seem to explain fertility behaviour better than the conventional income measure. The income effect as reflected by the coefficients of the first two equations decreases as economic status improves. This is in accordance with the MWB coefficients which are mostly negative except for MWB indices for transport and housing quality. However, none of the MWB coefficients are statistically significant.

The overriding factors in all equations are the mother's age, infant mortality and age at first marriage. They all show expected signs and are statistically significant* It can be concluded that biological factors are of primary importance in determining fertility in this area.

The ease of exposition, the dummy variable coefficients are converted into multiple classification coefficients and the MCA coefficients are presented in Table 8.** The MCA coefficients also render more convenient interpretation of the results for they provide comparisons to the grand mean rather than comparisons to the coefficients of the omitted categories. Adjusted deviations in Table 8

---

* It should be noted that in the case where a variable is presented by a set of dummy variables as a classification of various categories, the t values do not indicate whether that variable or that classification is statistically significant or not, although it is quite likely that the variable will be insignificant if all the t values of all dummy variables are small.

**The relationship between dummy regression and MCA coefficients are as follows:

$m_{ij} = d_{ij} - \sum_j p_{ij} d_{ij}$

m_{ij} = MCA coefficients for jth category of predictor i

d_{ij} = dummy regression coefficient for jth category of variable i

p_{ij} = proportion of observed cases in jth category of predictor i

Where - $\sum_j p_{ij} d_{ij}$ = MCA coefficient of the omitted category of predictor i

For details, see ESCAP (1979).

Table 7. Determinants of Actual Fertility in Ngao District (1979) Dependent Variable : Number of Pregnancies; Number of Cases = 132

I				II				III			
Predictors	Coeffi-cients	Standard error	t value	Predictors	Coeffi-cients	Standard error	t value	Predictors	Coeffi-cients	Standard error	t value
Constant	6.474			Constant	6.84			Constant			
Mother's age											
A1	-4.635	-.758	6.112	A1	-4.580	-.783	5.847	A1	-4.483	-.777	5.760
A2	-3.399	-.430	7.903	A2	-3.653	-.474	7.698	A2	-3.568	-.464	7.670
A3	-2.407	-.439	5.474	A3	-2.346	-.462	5.077	A3	-2.275	-.461	4.930
A4	-2.093	-.537	3.891	A4	-2.144	-.571	3.751	A4	-1.756	-.570	3.077
A5	-1.440	-.415	3.469	A5	-1.334	-.439	3.035	A5	-1.340	-.433	3.091
Economic Status											
Y1	1.510		3.324	MP11	.503	.434	1.160	MWB1	- .091	-.164	.554
Y2	0.674	.454	1.577	MP12	.520	.424	1.225	MWB2	- .119	-.149	.804
Y3	0.620	.427	1.687	MP13	.059	.400	.469	MWB3	.224	.140	1.596
		.367						MWB4	-.253	-.190	1.331
								MWB5	-.035	-.046	.758

Table 7 (continued)

I				II				III			
Predictors	Coeffi-cients	Standard error	t value	Predictors	Coeffi-cients	Standard error	t value	Predictors	Coeffi-cients	Standard error	t value
Land size											
L1	-.036	-.414	.089	L1	.072	.446	.161	L1	.078	.455	.170
L2	.489	.386	1.263	L2	.614	.410	1.497	L2	.511	.410	1.247
L3	.060	.478	.126	L3	.027	.498	.054	L3	.058	.499	.118
Father's Occupation											
OF	-.676	-.477	1.416	OF	.244	.473	.515	OF	-.12	-.486	.248
OG	-.621	-.540	1.419	OG	-.470	-.558	.842	OG	-.54	-.564	.960
Age at first Marriage	-.097	-.04	2.081	AM	-.117	-.049	2.350	AM	-.110	.048	2.29
Child deaths	.949	.129	7.305	CD	.967	.139	6.931	CD	.962	.134	7.13
R^2 = .683				R^2 = .660				R^2 = .672			
$\bar{R}^2$ = .642				$\bar{R}^2$ = .616				$\bar{R}^2$ = .623			
F = 16.722				F = 15.041				F = 13.76			

Table 8. Determinants of Fertility in Ngao District (1979)

Grand Mean 3.61

Number of cases = 132

	Distribution of Cases	666 Group Mean	Number of Pregnancies Adjusted Mean	Deviation from Grand Mean	Adj. Dev'n from Grand Mean	Eta^2 (4)^2	Eta^2 (4)^2 (1)	Beta^2 (5)^2	Beta^2 (5)^2 (1)
			3.61+(5)	(2) - 3.61					
1. Mother's Age (Years)	(1)	(2)	(3)	(4)	(5)				
15 - 20 (A1)	.037	1.000	0.622	-2.610	-2.988				
20 - 25 (A2)	.189	1.520	1.858	-2.090	-1.752				
25 - 30 (A3)	.174	2.608	2.850	-1.002	-0.760				
30 - 35 (A4)	.090	2.916	1.607	-0.694	-2.003				
35 - 40 (A5)	.159	3.904	5.817	0.294	.209				
40 - 45 (A6)	.348	5.589	5.259	1.979	+1.649				
							.41		.36
2. Per capita Household Income (baht)									
LE 1500 (Yn1)	.196	4.730	4.486	1.120	.876				
GT 1500 & LE 2500 (Yn2)	.212	3.928	3.650	0.318	.040				
GT 2500 & LE 4500 (Yn3)	.318	3.690	3.596	0.080	- .014				
GT 4500 (Yn4)	.272	2.472	2.976	-1.138	- .634				
							.10		.04
3. Father's Occupation									
Farmer	.727	3.354	3.517	-0.256	- .093				
Government Employee	.151	1.650	3.572	-1.960	- .038				
Other	.121	2.812	4.193	-0.798	+ .583				
							.11		.01
4. Land Size									
LE 3 rai	.325	3.325	3.793	-0.285	- .117				
GT 3 LE 6 rai	.318	4.095	4.252	0.485	.336				
GT 6 LE 9 rai	.151	3.350	3.823	-0.260	- .093				
GT 9 rai	.204	3.518	3.763	-0.092	- .153				
							.02		.01

indicate the effect of belonging in one category, having taken into account the effects of other categories. Eta^2 indicates how well the classification can explain the variabilities in the lependent variable.

Actual fertility in this sample is highly associated with mother's age. Its γ^2 is .4 which is four times more than that of per capita household income and father's occupation. Income has the expected negative effect, but can explain only 10 per cent of the variability of actual fertility. However, after taking into account the effects of other variables, the explanatory power (as reflected by beta2) of income, father's occupation and land size was reduced substantially, leaving mother's age as the major determinant. The implication seems to be that since demographic factors are the most important in this locality, it is possible to reduce fertility by providing more and better family planning information and further services and health facilities.

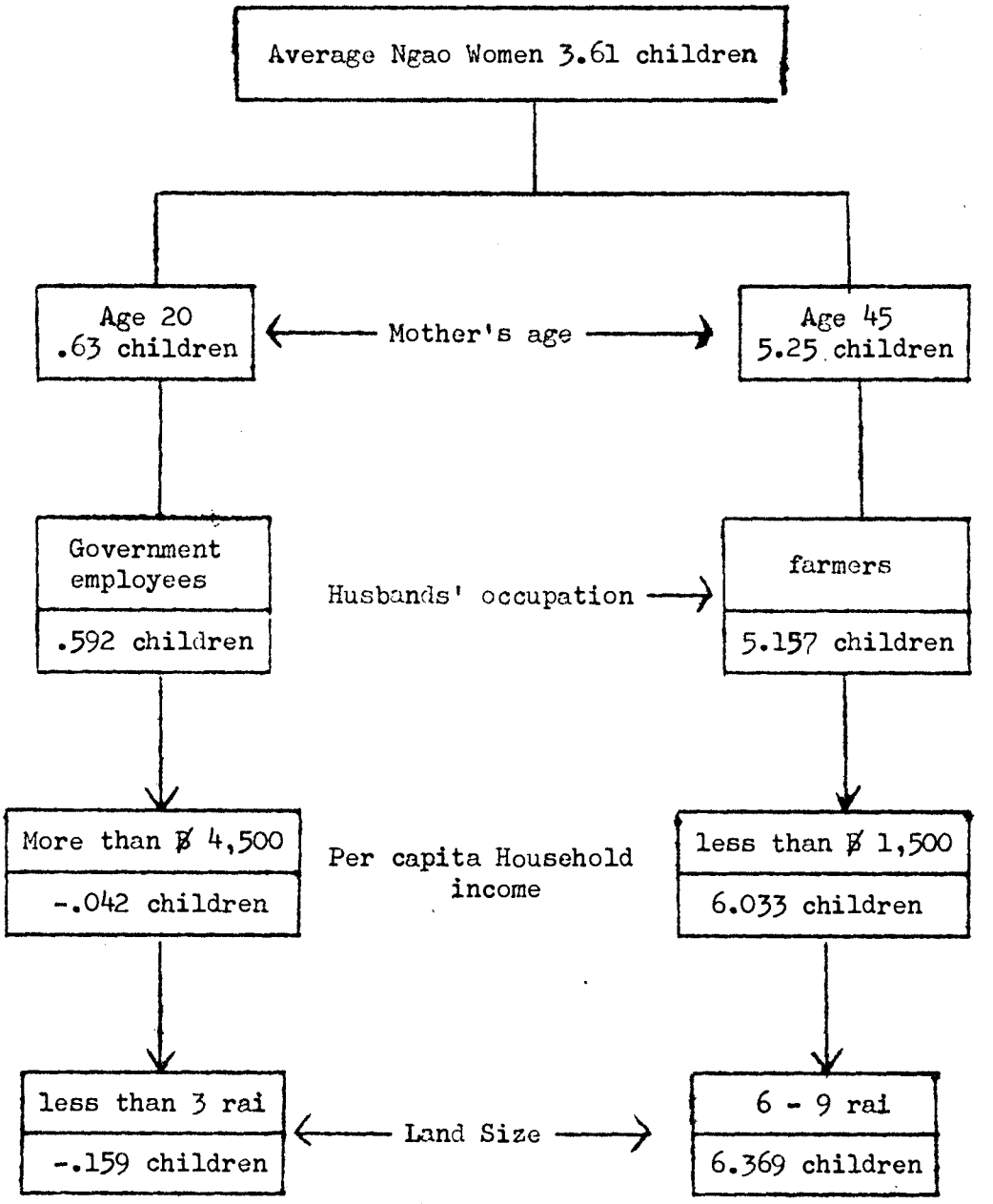
To illustrate the magnitude of the effects of some independent variables, a profile of Thai rural women are presented in Chart 1 which predicts for example, that a young rural woman aged 20 whose husband works as a government officer is expected to have .592 children. If her per capita household income is more than ฿ 4,500 and her family owns less than 3 rai of land, she is expected to have -.159 children. On the other hand, a 45-year old woman and farmer's wife can be expected to have 5.157 children. If her per capita household income is less than ฿1,500 and the family owns a medium-sized farm, she will have 6.369 children. These are the pictures of the more extreme cases.

Essentially, Table 8 indicates that younger women and poorer farmers have fewer children. Hull (1974) found the same result: that poor farmers tended to have the lowest fertility in an Indonesian village. The effect of a woman's age in this study is also in accordance with Knodel and Pitaktepsombati (1975), who discovered that the number of children ever born increases steadily with the age of women up to age 40.* In contrast to Arnold and Pejaranonda's findings which suggests higher utility of children in families with large farms (more than 10 rai), land size seems to have negative effects except for medium-sized

---

* However, they found that fertility decreased after the age of 40, owing to under-reporting by older women.

Chart 1. A Profile of Thai Women in Ngao District (1979)
(selected predictors)



Source : Table 8

farms (3-6) rai. For an owner of a small farm (less than 3 rai), an extra child will overly increase land pressure, while owners of larger farms may not find unpaid family labour sufficient. However, land size can explain very little of the variation in the dependent variable.

4.4 The Findings : Ideal Family Size

Desired fertility could be affected by those factors influencing actual fertility. In addition, actual family size itself may influence the response. Respondents may feel it is improper to reject their own children in front of a stranger. In cases where children were present at the interview, they might not want to hurt their children by giving an ideal family size smaller than the actual size. A study by Arnold and Pejaranonda (1977) found that the number of living children is the most predominant factor in reporting ideal family size. Thus, the number of living children is used as one of the independent variables.

None of the independent variables, except the number of living children (LC), was found to influence the ideal family size of respondents of both fathers and mothers. The regression results are as follows:

DFS_f = desired family size of fathers

DFS_m = desired family size of mothers

$$DFS_f = 2.46 + \underset{(7.07)}{\underset{(.040)}{.286}}\ LC \ ; \ \bar{R}^2 = .27, \ F = 50.13$$

$$DFS_m = 2.81 + \underset{(4.30)}{\underset{(.039)}{.169}}\ LC \ ; \ \bar{R}^2 = .12, \ F = 18.54$$

Adding other variables reduced $\bar{R}^2$. The equations with a set of all independent variables are shown in Appendix 2. The adjusted R^2 ($\bar{R}^2$) for DFS_f is .26 and that of DFS_m is .06.

A number of explanations can be offered for these results. First, perceived utility and cost of children in relation to the parents' economic position may be a more direct and influential factor*. To rural mothers who were brought up in a traditional setting, children may have a very high intrinsic value, something like a fulfilment of motherhood which may not be adequately captured by the age proxy. If properly structured, information on perceived utility of children may be a more important factor for ideal family size of mothers*. Second, the question may not be well put. The respondents were simply asked the number of sons and daughters they would like to have. This could mean different things to different people. Third, there is very little variation in the stated number of ideal family size. For males, average ideal family size is 3.33 and its standard deviation is 1.11. For females, average ideal family size is 3.32 and its standard deviation is .98. That is to say 67 per cent of fathers want to have 3.33 + 1.11 or 2.22 to 4.44 children while 67 percent of mothers want 2.34 to 4.30 children. The replies mostly fluctuated between the value 2 and 4. There were only two respondents who wanted a single child. Thus the numbers two and four seem to be the norm for relatively modern and traditional families respectively.

V. KNOWLEDGE ATTITUDES AND FAMILY PLANNING PRACTICES

Only 119 male and 129 female respondents provided information for this section. It was discovered that 21 male (17.6 per cent) and 15 female respondents (11.6 per cent) had no knowledge about family planning (Table 10) but they are mostly over 40 and 45 years of age. There was only one couple within the highly productive age brackets that had never heard of family planning. There were two male respondents in the 21-30 age bracket who stated that they had no knowledge about family planning practives, but their wives did have some knowledge about contraceptive devices.

---

* According to Arnold and Pejaranonda (1977), in explaining the ideal family size of 2778 cases, r^2 of family income is less than .01, while the index of perceived cost and utility of children is .01 and .04 respectively.

Table 10. Respondents Without Knowledge of Family Planning Practices

Age	Respondents	
	Male	Female
Less than 20	-	1
21 - 30	3	-
31 - 40	3	2
more than 40	15	12
Total	21	15

Source : Field Survey

Table 11. Source of Information on Family Planning Practices in Ngao (1979)

	Source of Information	
	Male	Female
Doctors, health officers	67	93
Friends and relatives	25	21
Books and documents	3	-
Others	3	-
Total	98	114

Source : Field Survey

Table 12. Popularity of Different Contraceptive Devices in Ngao (1979)

	Popularity of Family Planning Device	
	Male	Female
Pills	94	109
IUD	50	44
Injection	23	21
Sterilisation	56	48
Condom	26	10
Others	2	1

Source : Field Survey

Among those who know about family planning practices, their main source of information is from the staff of the public health service (Table 11). There is a fair amount of diffusion through personal contacts. Other means of diffusion are unimportant. The most popular devices are pills, followed by sterilisation and IUD (Table 12).*

In general, the respondents have positive attitudes towards family planning, except for the concern about support in old age (Table 13). Respondents were a little confused about religious implications on birth control. A number of respondents who said that birth control was sinful were not quite sure whether it was against Buddhism. On the whole, Buddhism does not pose a strong barrier against family planning. An attempt has been made to see if respondents' attitudes were related to their economic status. All 17 attitudes were factor analysed into 3 factors and were canonically related to MWB indices. The result was that correlation is weak.** The first non-significant canonical correlation is .36, where the degree of significance is .242. Attempts were also made to regress these attitudes on economic and social variables, such as economic status, age and education, but their R^2's are negative. Therefore the results are not presented, but factor loading and factor scores for these three attitudes are given in Appendix 3.

As for current practice in the present sample, slightly more than half of the respondents practise birth control (Table 14). Women are more common adoptors of family planning practices. Men have refrained from birth control for fear of reduced physical and sexual fitness. At the time of the survey, there were rumours that male adoptors usually fainted during the operation and that doctors use a knife as big as a chopper, and so on. More education and proper propaganda are needed.

---

* This is in terms of knowledge, not usage.

** Canonical correlation is a statistical method for assessing association between two set of indices.

Table 13. Attitudes Towards Family Planning Practices

	(per cent)			
	Positive Attitude		No attitude	
	Male	Female	Male	Female
1. All methods of birth control are sinful.	44.0	49.2	1.0	2.5
2. Birth control helps improve family's financial situation.	96.6	96.7	1.0	1.2
3. Higher education is better afforded when birth control is practised.	94.0	95.9	1.0	1.2
4. Vasectomy in males decreases their wives' sexual satisfaction.	60.0	51.6	21.2	35.3
5. Sterilisation in females does not affect their spouse's sexual satisfaction.	58.5	50.0	18.7	33.6
6. Birth control practice prevents mothers' health from deteriorating.	67.8	69.7	10.2	12.3
7. Birth control helps one to have more to leave to all one's children.	94.9	95.1	2.0	1.0
8. Birth control provides more time for working.	96.6	97.5	1.0	1.2
9. After vasectomy, men can no longer perform heavy physical tasks.	67.8	63.1	1.0	11.5
10. Birth control is not against Buddhism.	69.5	69.7	8.5	9.8
11. Pill-taking decreases women's sexual ability.	72.9	59.8	17.0	30.3
12. Contraceptive injection decreases women's sexual ability.	71.2	58.2	20.3	33.1
13. Birth control allows wives to be flirtatious	68.6	55.7	14.4	26.2
14. Birth control allows husbands to be flirtatious.	54.2	42.6	11.0	27.9
15. Sterilisation in females does not affect their work.	76.3	76.2	12.7	9.0
16. I U D insertion does not affect the users' work capacity.	76.3	75.4	14.4	12.3
17. Having a lot of children is an insurance for comfort in old age.	20.3	16.4	1.7	1.6

* These are positive attitudes towards family planning and not positive replies, e.g. an answer 'no' for question 1 is considered as a positive attitude.

Table 14. Current Family Planning Practice in Ngao (1979)

	Current Practice	
	Male	Female
Pills	-	48
Sterilisation	4	12
Innoculation	-	6
IUD	-	1
Total number of adopters	4	67
Total number of respondents	119	129

Source : Field Survey

The findings of this study can be summarised as follows. First, biological conditions in the rural area of Ngao District are still the major determinants of fertility. Second, desired family size is slightly lower than actual family size reflecting the possibility of further reduction in fertility. Third, although the family planning service has been available for a long time, families have not yet had proper knowledge about contraceptive devices except for the most popular ones, namely the pill and injection. Lastly, there are few cultural and religious barriers to family planning practices in this area.

REFERENCES

Arnold, Fred and Chintana Pejaranonda, 1977. Economic Factors in Family Size Decisions in Thailand. World Fertility Survey: Survey of Fertility in Thailand Report No. 2, Bangkok.

Bulatao, Rodolfo and Fred Arnold. 1977. "Relationship Between the Value and Cost of Children and Fertility : Cross Cultural Evidence", East West Population Institute Reprint No. 92, Honolulu.

Cassen, R.H. 1976. "Population and Development : A Survey", World Development Vol. 4, Nos. 10/11 pp. 785-830.

Chalatorn, T. 1970 "Population Projection for Thailand 1960-1990". National Statistical Office, Bangkok.

Chamratrithirong, Aphichat. 1976, Fertility, Nuptiality and Migration in Thailand, 1970 Census : The Multiphasic Response Theory. Unpublished Ph.D. Thesis, Brown University.

Creager, James M., Anne. S. McCook, and Bernice Slutsky. 1974. The Policy Relevance of Recent Social Research on Fertility. Occasional Monograph Series No. 2, An ICF Staff Report, Smithsonian Institution, Washington D.C.

ESCAP. 1979. "Multiple Classification Analysis and Its Application to the 1974 Figi Fertility Survey", in Regional Workshop on Techniques of Analaysis of World Fertility Survey Date. Asian Population Studies Series No. 44.

Fawcett James T. et al. 1974. "The Value of Children in Asia and the United States : Comparative Perspectives", Papers of the East West Population Institute No. 32, East West Center Honolulu.

Hugo, Graeme. 1975. "Demographic Research in Indonesia : A Review." Department of Demography, RSPacS, A.N.U.

Hull, T.H. 1974. "Population Control in Village Java : the case of Maguwonardjo". Monash University Centre of Southeast Asian Studies Working Papers 3.

Kiranandara, Thienchay, 1977. "An Economic Analysis of Fertility Determination Among Rural and Urban Thai Women", Institute of Population Studies Paper No. 20, Chulalongkorn University, Bangkok.

Knodel, John and Visid Prachuabmoh. 1974. "Demographic Aspects of Fertility in Thailand". Journal of Population studies, Vol. 28, no. 3.

Knodel, John and Pichit Pitaktepsombati. 1975. "Fertility and Family Planning in Thailand : Results of the second round of a national survey. "Institute of Population Studies Paper No. 19, Chulalongkorn University, Bangkok.

Leibenstein, Harvey. 1974. "An Interpretation of the Economic Theory of Fertility : Promising Path of Blind Alley? Journal of Economic Literature. June.

Pardthaisong, Tieng. 1978. "The Recent Fertility Decline in the Chiang Mai Area of Thailand". Paper of the East West Population Institute No. 47, Honolulu.

Prasithrathsint, Suchart. 1976. "Trends and Differentials in Fertility." in Population of Thailand. ESCAP Country Monograph Series No. 3. Bangkok.

Prasithathsint, Suchart, Tawatchai Arthonthurasook and Pisit Sukree-yaponse 1978. A Micro Socio-Economic Analysis of Thai Fertility Behaviour: A Rural Family Perspective, The Findings Department of Social Sciences, Mahidol University.

Social Science Research Center (SSRC). 1978. "Fertility and Family Planning in Rural Northern Thailand, 1976 - 1977. "Faculty of Social Sciences, Chiangmai University. (draft).

Shevasunt, Sampong, Dennis P. Hagan and Kwanchai Thaithong. 1978. Fertility and Family Planning in Rural Northern Thailand", Studies in Family Planning, vol. 9, Number 8, The Population Council.

APPENDIX I

Name of respondent (Mr., Mrs.) ..... Surname .....

Address .....

Date of Interview .....

Interview time, from ..... to .....

Name of interviewer .....

I. To be filled by interviewers from observation.

1.1 Types of wall of the house

- ☐ Woven bamboo strips
- ☐ walled with Tong Tung leaves
- ☐ wooden
- ☐ brick and wooden walls
- ☐ brick walls
- ☐ others (please specify) .....

1.2 Which of the following best describes the house?

- ☐ one storey built on the ground
- ☐ one storey built on stilts
- ☐ two storeys

1.3 Is the house painted or not?

- ☐ painted
- ☐ not painted

1.4 Roofing

- ☐ roofed with Tong Tung leaves
- ☐ thatched
- ☐ roofed with corrugated galvanised iron
- ☐ tiled
- ☐ wooden
- ☐ others (please specify) .....

1.5 Is the housed fenced?

- ☐ yes
- ☐ no

1.6 Where is the toilet?

- ☐ in the house
- ☐ separated from the house

1.7 The distance from the house to the nearest health station is ..... kms.

The distance from the house to the nearest hospital is ..... kms.

II. Basic data

2.1 Which health stations or hospitals do you usually go to? .....
How do you get there?

☐ walk for ..... minutes

☐ go by a private vehicle ..... time consumed ..... minutes

☐ go by a mini bus, time consumed ..... minutes

2.2 Usually there are ..... people in the house.

At the present moment there are ..... people in the house.

Please give details in the space provided in Table 2.1

Notes		
Is the person living in the house	No.	Moved out (date)
		permanently
		temporarily
	Yes	moved out (date)
		permanently
		temporarily
Education		at school (level)
		Completed (level)
Marital Status		Separated or Divorced
		Married
		Single
Sex		Female
		Male
Age		Month
		Year
Relationship to respondent		
Name/Surname		
No.		

III Occupation and income of family members

	Members					
	1	2	3	4	5	6
3.1 Name						
3.2 Main occupation						
3.3 Annual income from main occupation						
3.4 Second occupation						
3.5 Annual income from second occupation						
3.6 Other incomes						
(a) money sent by relatives						
(b) rents from						
- land						
- houses						
- animals						
- others (specify)						
(c) interests						
Total						
3.7 Time spent for work within one year (specify units of time)						

IV. Residence

4.1 The house in which you live

☐ belongs to you, if sold will be worth ..... baht
if rented will be worth ..... baht/month/year

☐ is a rented house and the rental is ..... baht/month

☐ belongs to your relatives. If you have to pay the rent, the rental would be ..... baht/month/year.

The width of the house (indicate units) .....
The length of the house (indicate units) .....
The house has been built for ..... year (s)

4.2 The piece of land upon which the house is built

☐ belongs to you, if sold will be worth ..... baht
if rented will be ..... baht/month/year

☐ does not belong to you and you have to pay rental for ..... baht/month/year

4.3 Besides the land and the house in which you are living, do you still have any other real estate?

☐ Yes ☐ No

☐ land only (please give details.)

	Size of land	Estimated Value	Estimated Rental
1.	.....		
2.	.....		
3.	.....		

☐ house only

	Estimated Value	Estimated Rental
1.	_____	_____
2.	_____	_____
3.	_____	_____

☐ land with house

	Estimated Value	Estimated Rental
1.	_____	_____
2.	_____	_____
3.	_____	_____

V. Assets

5.1 Furniture, cooking utensils, electrical equipment

Lists	Units	Notes
1. Tables		
2. Beds		
3. Mattresses		
4. Mosquito nets		
5. Mosquito nets		
6. Cupboards		
7. Stoves (earthen . gas)		
8. Armchairs		
9. Sewing machines		
10. Transistor Radios		
11. Thermos (for keeping hot water)		
12. Thermos (for keeping ice)		
13. Torches		
14. Flat irons		
15. Large kerosene lamps		
16. Small canned lamps		
17. Water wells		
18. Artesian wells		
19. Water-pumping equipment		
20. Water tanks (Please specify,types)		
21. Electric generators (specify) _____		
22. Electric bulbs		
23. Other electrical equipment (please specify) _____		
_____		

5.2 Vehicles

List	Number	Notes
1. Carts		
2. Tricycles		
3. Bicycles		
4. Motor-cycles		
5. Motor-vehicles		
6. Others _____ (Please specify) _____		

5.3

List	Number	Notes
1. Ducks		
2. Fowl		
3. Pigs		
4. Calves		
5. Bulls		
6. Cows		
7. Young Buffaloes		
8. Male buffaloes		
9. Female buffaloes		
10. Others _____ (specify)		

VI. Farming System

6.1 Are you or any other members of your family engaged in farming activities?

☐ Yes ☐ hire other people to work for you ☐ No

(If "no" is the answer, skip to section VII.)

6.2 If you do, you farm

☐ your own land ☐ rented land

(Fill details in the following table.)

Types of land and crops	Land size (rai)	Annual output (specify cropping period)
Paddy field for		
a		
b		
c		
Farm land for		
a		
b		
c		
Orchard for		
a		
b		
c		
Others (specify) _____ for		
a		
b		
c		

6.3 Farming Equipment

List	Number	Notes
1. Small silos		
2. Ploughs		
3. Water pumps for paddy fields		
4. Thrashing machines		
5. Tractors		
6. Insecticide spraying equipment		
7. Artesian well in the paddy fields		
8. Others (please specify) _____		
_____		

VII. Family Planning (Interview both males and females who are not over 45 years of age)

7.1 You were married at .....years of age
Your spouse was .....years of age

7.2 You want ..... sons, ... daughters.
Your spouse wants ..... sons, ... daughters.

7.3 If you can only have one child, you want

☐ a boy ☐ a girl

If you can only have 2 children you want ..... boys, ... girls.
If you can only have 3 children you want ..... boys, ... girls.
If you can only have 4 children you want ..... boys, ... girls.
If you can only have 5 children you want ..... boys, ... girls.
If you can only have 6 children you want ..... boys, ... girls.

7.4 In your opinion, families with many children are those that have ..... children.
In your opinion, families with few children are those that have ..... children.

7.5 In your opinion, families with ..... children should start practising birth control.

7.6 Do you know any birth controlling methods (or any family planning device)?

☐ Yes ☐ No ☐ No reply

	Methods	Source of Information	Date that respondents were informed
a.			
b.			
c.			
d.			
e.			
f.			

7.7 Have you ever practised birth control?

☐ Never ☐ Yes Method a .....
b .....
c .....

7.8 At the moment are you practising birth control?

☐ Yes - Method (specify) .....

- Expenses ..... baht

☐ No

7.9 For those who used to practise birth control and had given up, and those who have never practised birth c ntrol, the reason for not doing so is

---

7.10 When you started practising birth control you were ..... years of age.

7.11 The reason for a decision to practise birth control then was .....

7.12 When you started practising birth control you had ..... children; ..... boys, ... girls.

7.13 The reason you did not practise birth control before then was .....

7.14 No. of pregnancies .....

No. of live births .....

VIII Attitudes towards birth control. Ask the interviewees whether they agree, disagree or have no knowledge about the following information and put the appropriate symbols in front of each number.

✓ Agree X Disagree O Don't know

1. All methods of birth control are sinful.
2. Birth control helps improve family's financial situation.
3. Higher education is better afforded when birth control is practised.
4. Vasectomy decreases their wives' sexual satisfaction.
5. Sterilisation in females does not affect their spouses' sexual satisfaction.
6. Birth control practice prevents mothers' health from rapid deterioration.
7. Birth control helps one to have more to leave to all one's children.

8. Birth control provides more time for working.
9. After vasectomy, males can no longer perform heavy physical tasks.
10. Birth control is not against Buddhism.
11. Pill-taking decreases females' sexual ability.
12. Contraceptive injection decreases females' sexual ability.
13. Birth control allows wives to be flirtatious.
14. Birth control allows husband to be flirtatious.
15. Sterilisation in females does not affect their work.
16. I U D insertion does not affect the users' work capacity.
17. Having a lot of children is an insurance for comfort in old age.

APPENDIX II

AII.1 Desired family size of mothers

$\bar{R}^2 = .06$, $F = 1.52$

variable	coefficient	tandard error	t value
Number of living children	.14	.05	2.47
Occupation of father			
farmer	.37	.29	1.27
public servant	.24	.33	0.73
Infant deaths	.03	.08	0.47
Per capita household income			
Less than ฿1500	-.11	.29	0.40
฿1500 - ฿2500	.10	.26	0.39
฿2500 - ฿4500	.00	.23	0
Age of Respondents			
Less than 25	-.36	.52	0.69
26 - 30	-.14	.31	0.46
31 - 35	.01	.30	0
36 - 40	.19	.35	0.57
41 - 45	.13	.27	0.47
Land Size			
Less than 3 rai	-.12	.26	0.46
3 - 6 rai	-.22	.24	0.92
6 - 9 rai	-.00	.29	0
Constant	2.68		

AII.2 Desired family size of fathers

$\bar{R}^2$ = .26, F = 4.39

variable	coefficient	standard error	t value
Number of living children	.22	.05	4.19
Preference for sons	.00	.01	0.40
Occupation of fathers			
Farmers	-.02	-.28	0.10
Public servants	-.33	-.33	0.99
Land size	.02	.01	1.74
Infant deaths	.07	.07	0.97
Age of respondents (years)			
15 - 20	.36	.37	0.96
21 - 25	.46	.37	1.26
26 - 30	.46	.36	1.28
31 - 35	.81	.39	2.04
36 - 40	.38	.37	1.01
Per capita household income			
Less than ₦1500	.69	.29	0.14
₦1500 - ₦2500	.14	.26	0.53
₦2500 - ₦4500	.13	.23	0.58
Constant	1.97		

APPENDIX III

Table A 3.1 Factor Loading and Factor Score for Factor Analysis of Attitudes

	Factor Loading	Factor Score
Male Respondents		
FA 4 Life Betterment		
No 2	.80	.36
No 3	.77	.35
No 7	.75	.34
No 8	.65	.29
FA 5 Sexual Capability		
No 11	.99	.51
No 12	.99	.51
FA 6 Working Capacity		
No 15	.97	.51
No 16	.97	.51
Female Respondents		
FA 1 Life Betterment		
No 2	.93	.31
No 3	.88	.29
No 7	.71	.24
No 8	.92	.30
FA 2 Sexual Capability		
No 11	.93	.43
No 12	.93	.43
No 13	.64	.30
FA 3 Working Capacity		
No 15	.96	.52
No 16	.96	.52

APPENDIX IV

Probability of Accepting a Family Planning Programme

A family planning program has been in operation in the district since 1969. Eighty women of this sample have ever practised family planning. Table 9 presents the result of a logistic function of adoption of family planning practice of Ngao district. The independent variables are per capita household income, land/man ratio, education, age and family type. Family type is a dummy variable taking a value of 'one' if the respondent lives in an extended family.

The results are presented in Table A4.1. The coefficients show expected signs. The increase in values of all independent variables except education reduces the probability of adoption of family planning practices.

According to Table A4.1, a twenty-year-old woman that has average characteristics, such as four years of education, coming from a non-nucleus family, and having per capita household income and land/man ratio of ฿ 4,000 and 1.24 respectively, will have a probability of adopting family planning practices of .12, and if her education increases by one year the probability of adoption increase by .002.*

---

* Probability of adoption (p) can be calculated from the following formula.

$$p = \frac{1}{1 + e^{-X_j \beta}}$$

Where X_j is a vector of characteristics of individual$_j$

β is a vector of regression coefficients

and $$\frac{\partial P}{\partial X} = \beta_j \; p(1-p)$$

Table A.1 Logistic Function of Adoption of Famuly Planning Practices in Ngao District (1979)

Variables	Coefficients	Asymptotic standard error	Asymptotic t-ratio	Asymptotic Significance
Constant	1.795	.520	3.44	.0005
Per capita household income	-.00002	.00002	.82	.412
Land/man ratio	-.048	.084	.57	.563
Education	.018	.039	.46	.639
Age	-.037	.011	3.38	.717
Family Type	-.055	.192	.28	.772

SEAPRAP

THE SOUTHEAST ASIA POPULATION RESEARCH AWARDS PROGRAM

PROGRAM OBJECTIVES

* To strengthen the research capabilities of young Southeast Asian social scientists, and to provide them with technical support and guidance if required.

* To increase the quantity and quality of social science research on population problems in Southeast Asia.

* To facilitate the flow of information about population research developed in the program as well as its implications for policy and planning among researchers in the region, and between researchers, government planners and policy makers.

ILLUSTRATIVE RESEARCH AREAS

The range of the research areas include a wide variety of research problems relating to population, but excludes reproductive biology. The following are some examples of research areas that could fall within the general focus of the Program:

* Factors contributing to or related to fertility regulation and family planning programs; familial, psychological, social, political and economic effects of family planning and contraception.

* Antecedents, processes, and consequences (demographic, cultural, social, psychological, political, economic) of population structure, distribution, growth and change.

* Family structure, sexual behaviour and the relationship between child-bearing patterns and child development.

* Inter-relations between population variables and the process of social and economic development (housing, education, health, quality of the environment, etc),

* Population policy, including the interaction of population variables and economic policies, policy implications of population distribution and movement with reference to both urban and rural settings, and the interaction of population variables and law.

* Evaluation of on-going population education programs and/or development of knowledge-based population education program.

* Incentive schemes — infrastructures, opportunities; overall economic and social development programs

SELECTION CRITERIA

Selection will be made by a Program Committee of distinguished Southeast Asian scholars in the soci sciences and population. The following factors will be considered in evaluating research proposals:

1. relevance of the proposed research to curre issues of population in the particular countries of Southeast Asia;
2. its potential contribution to policy formation, program implementation, and problem solving;
3. adequacy of research design, including proble definition, method of procedure, proposed moc of analysis, and knowledge of literature;
4. feasibility of the project, including time requirement; budget; and availability, accessibility, ar reliability of data;
5. Applicant's potential for further development.

DURATION AND AMOUNT OF AWARDS

Research awards will be made for a period of up t one year. In exceptional cases, requests for limited extension may be considered. The amount of an award will depend on location, type and size of th project, but the maximum should not exceed US$7,500.

QUALIFICATIONS OF APPLICANTS

The Program is open to nationals of the following countries: Burma, Indonesia, Kampuchea, Laos Malaysia, Philippines, Singapore, Thailand and Vie nam. Particular emphasis will be placed on attracting young social scientists in provincial areas.

Applications are invited from the following:

* Graduate students in thesis programs

* Faculty members

* Staff members in appropriate governmental an other organizations.

Full-time commitment is preferable but applicant must at least be able to devote a substantial part o their time to the research project. Advisers may be provided, depending on the needs of applicants.